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Lindberg

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[54] **STEERABLE ACOUSTIC TRANSDUCER**

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[58] **Field of Search** 310/334, 366, 310/337; 367/153, 154, 164, 155, 105, 157, 138, 103; 128/661.01, 662.03, 660.01

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,922,572	11/1975	Cook et al.	310/334
4,477,783	10/1984	Glenn	367/155
4,805,157	2/1989	Ricketts	367/155
5,329,496	7/1994	Smith	367/140

FOREIGN PATENT DOCUMENTS

0219171 4/1987 European Pat. Off. .

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin, vol. 20, #9, Feb. 1978, pp. 3749–3751.

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[57] **ABSTRACT**

An acoustic transducer is constructed as a stacked configuration of multi-layer transducer elements separated from one another by an electrical insulating material. Each multi-layer transducer element has a layer of acoustically transparent electro-acoustic transducer material having opposing planar surfaces with electrically conductive material deposited thereon. For each multi-layer transducer element, the electrically conductive material is formed into parallel strips electrically isolated from one another on at least one of each element's opposing planar surfaces. The parallel strips associated with each multi-layer transducer element have a unique angular orientation.

15 Claims, 3 Drawing Sheets